

## Section 5-4: Properties of Triangles

**By the end of this lesson, you should be able to answer:**

- How do you classify triangles according to their sides and angles?
- How do you identify and use properties of triangles?

**Where you might see this in the real world:**

- Travel, interior design, navigation

Define the following terms:

1. Triangle
2. Vertex
3. Congruent sides
4. Congruent angles
5. Exterior angle
6. Base angles

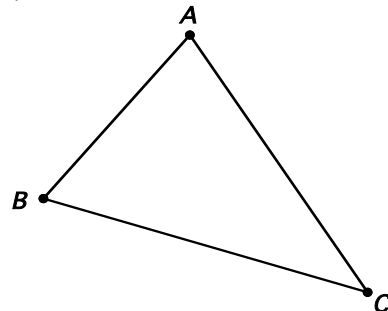
We've all seen triangles before. We already know that the word can be broken down into two parts: "Tri" means three and "angle" means angle. Every triangle will have three angles and three sides.

Take a look at the triangle below. We need to identify the vertices, sides, and angles. \*\*\*Notation is important!!!\*\*\*

Vertices:

Sides:

Angles:



We can call this triangle  $\triangle ABC$ ,  $\triangle BAC$ ,  $\triangle CAB$ , etc. Notice we name it by starting at one vertex and continuing around the triangle in one direction. The triangle we have above here is a **scalene triangle**, as well as **acute**.

Scalene triangle –

Acute triangle –

These aren't the only special triangles we have. The following triangles all have special qualifications as well.

Isosceles triangle –

Equilateral triangle –

Obtuse triangle –

Right triangle –

Here are some properties that are useful that will always be true with triangles:

- Property 1: The sum of the angles in a triangle is  $180^\circ$ .
- Property 2: If you add two sides of a triangle, the sum will be bigger than the length of the third side.
- Property 3: The longest side is opposite (does not touch) the largest angle, and the smallest side is opposite the smallest angle.
- Property 4: The exterior angle formed at one vertex equals the sum of the other two interior angles.
- Property 5: If two sides are congruent, then the angles opposite those sides are also congruent.

Example 1: For the two triangles, list the sides from shortest to longest.

$$m\angle FHG = 50^\circ$$

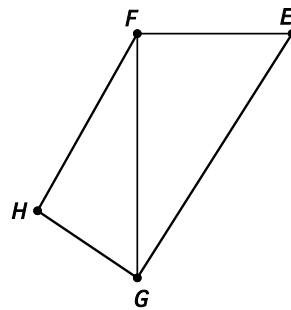
$$m\angle HGF = 75^\circ$$

$$m\angle GFH = 55^\circ$$

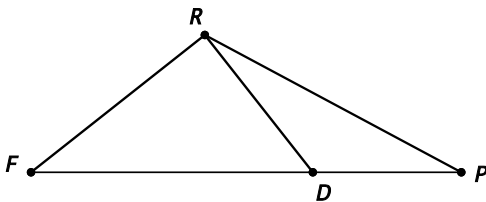
$$m\angle GFE = 90^\circ$$

$$m\angle FEG = 40^\circ$$

$$m\angle EGF = 50^\circ$$



Example 2: In the figure,  $m\angle RFD = 33^\circ$ ,  $m\angle FRD = 90^\circ$ , and  $m\angle DRP = 24^\circ$ . Find the measures of the other angles.



Problem Set:

"Change your thoughts and you change your world." - Norman Vincent Peale